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## Mobilising the Household Data Required to Progress toward the SDGs

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**Abstract:** Progress on the Sustainable Development Goals (SDGs) will be reported annually, but at present data on poverty-related SDGs are not updated frequently, nor are the data always available promptly. This paper reviews the key non-census data sources underlying the MDGs – household surveys (national and international), and administrative and registry data – to assess which data sources could provide the more frequent data required to design and coordinate policies, measure, manage, and monitor progress towards the poverty-related SDGs. It also reviews new data sources such as opinion polls ‘big data’, satellite data, call records, and other digital breadcrumbs to see how these might augment the information required to assess progress in the SDGs. We evaluate each option according to ten criteria. While each option has strengths, and each will clearly contribute, high quality multi-topic household surveys complemented by interim lighter surveys have a demonstrated ability to collect the core indicators of human poverty at an individual and household level in a rigorous way, so are likely to remain a core component of the data framework.

**Keywords:** Post-2015 development agenda, Data revolution, Household survey data, Public opinion polls, Administrative data, Big data.

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## Executive Summary

The post-2015 framework and the heightened demands it will place upon international monitoring systems have drawn new attention to the indicators that should be collected, as well as to the type(s) of data collection best suited to that task. Ideally, the Sustainable Development Goal (SDG) measures will be used to motivate, monitor, and manage development interventions – thus accelerating progress and increasing efficiency. This paper considers how to advance frequent data collection for poverty-related indicators, such as those proposed by the Sustainable Development Solutions Network (SDSN) in *Indicators for the SDGs*.<sup>1</sup>

We critically examine three main options for collecting post-2015 data:

1. Household survey instruments
  - a. Large multi-topic household surveys (LSMS, DHS, MICS, national surveys)
  - b. Quick interim household surveys
  - c. Public opinion surveys (Gallup, World Values, Regional Barometers, Social Weather Station)
2. Administrative and registry data
3. Big Data: Satellite, marketing, internet/social media, call data records, and other so-called ‘digital breadcrumbs’<sup>2</sup>

We evaluate each option according to ten technical criteria and seek to highlight examples of best practice. Criteria include basic issues such as covering core indicators – frequently (where useful) and for many countries – in a multi-topic and integrated way. Data should be of high quality yet affordable, timely and available, and comparable across time and (where relevant) across countries. Data should be disaggregated by social groups, include missing populations, and give insights into intra-household dynamics. Additional non-technical considerations include the need to build national statistical systems, as well as cost and data protection.

Critical evaluations and reviews of the three main options point to the potential contributions of each as well as their limitations. The measurement approaches are not mutually exclusive; however, the strengths and weaknesses need to be carefully understood so that they are used well, each to its best advantage.

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<sup>1</sup> <http://unsdsn.org/resources/publications/indicators/>.

<sup>2</sup> <http://www.economist.com/news/books-and-arts/21595883-how-re-engineer-world-measure-man-0>.  
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**Household surveys** are the building blocks of rigorous and transparent monitoring. Key strengths remain the wealth of knowledge that informs design and implementation, their multi-topic and integrated nature, and large sample sizes that permit a high level of measurement precision coupled with the possibility of disaggregation for an array of regions and potentially marginalized or disadvantaged groups. Feasible but important reforms need to be made to conventions in order to obtain quality data with a core set of standardized indicators, as well as more frequent, timely, and gendered data on the emerging indicators.

**A short powerful survey** of national and international indicators would complement in-depth household surveys. National, international, and regional survey instruments and programmes point to the feasibility of the regular monitoring of a key set of core indicators of monetary and non-monetary poverty. New innovations, notably Computer-Assisted Personal Interviewing (CAPI) and cloud-based technology, can facilitate collecting data and making them available in a timely fashion.

**Public opinion surveys** are extremely useful in establishing people's perceptions and values, and the relative strengths of different perceptions. Country coverage using standard definitions is often a signal advantage of such surveys. Other strengths can be frequency and cost, as in the exemplary case of the Philippines' Social Weather Station.<sup>3</sup> However, public polling data appear to be less useful in measuring objective deprivations.

**Registry and administrative data** offer advantages relating to cost, frequency, and sample size. Also, administrative data systems can be useful for motivations beyond measurement, such as institutional strengthening and service delivery management. But at present, coverage in many countries is incomplete and the quality of data is problematic – progressive systemic improvements are needed.

We also focus on the potential **Big Data** offers to strengthen human poverty data, rather than their evident and certain role in providing environmental data for the SDGs. We highlight their potential for sampling for household surveys and for generating poverty indicators. Limitations include a focus so far on monetary/material indicators and spatial disaggregation, and an inability to study intrahousehold dynamics. Moreover, further validation of the non-representative nature of Big Data is needed.

To facilitate discussion, we evaluate the diverse options in relation to one another, in the light of the ten criteria. Each option has strengths, and each will clearly contribute. Yet we conclude that high quality multi-topic household surveys complemented by interim lighter surveys have a demonstrated ability to

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<sup>3</sup> <http://www.sws.org.ph/>.  
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collect the core indicators of human poverty at an individual and household level in a rigorous way. Such high quality and timely surveys could be supported by international agencies and/or national statistical offices, depending upon the context and capacity in 2015. New technologies are likely to aid in data collection and timely analysis. In our view, while polling surveys have value in eliciting perceptions – vitally important in themselves – they do not appear to provide the most accurate data on objective deprivations, either directly or through subjective proxies. Administrative systems could provide many SDG indicators frequently and comprehensively – but they need strengthening in many countries to improve data coverage and quality. Big Data, too, holds the promise of complementing traditional data collection – but much more experimentation is needed before such data become part of our standard poverty monitoring toolkit. The merging of data from different instruments in order to exploit fully their potential and to explore the interconnections between the different dimensions of poverty is partly underway and must be strengthened, particularly to ensure the merging of human poverty and environmental aspects.

To guide data collection efforts, we stress the need for cost estimates of the various proposals under consideration – as very little information is available to inform a rigorous cost-benefit analysis. Our review also suggests the need for an international body to fulfil functions others have described in detail, such as a) continuous improvement of indicator definitions; b) ongoing support for questionnaire design and harmonisation; c) synthesis of data and indicators for ongoing monitoring; d) preparing time-saving new technologies for survey data collection, entry, analysis, visualization, publication, and dissemination; and e) further analysis of the possibilities to link data from diverse sources.

## 1. Introduction

The development of a post-2015 framework has drawn new attention to the indicators that should be collected<sup>4</sup> and the heightened demands this will place on National Statistical Offices (NSOs) and other actors.<sup>5</sup> It has also shown that cost-effective and high-visibility examples of success have used measures for monitoring, policy coordination, targeting, and resource allocation, among other tasks. Management processes to meet the Sustainable Development Goals (SDGs) can be strengthened if accurate and timely measures of progress are produced.

Informed by the wealth of recent reflections on data needs and potential avenues for meeting those needs,<sup>6</sup> this paper considers how to advance the task of data collection of core indicators of human poverty.

First, we propose ten technical criteria a post-2015 monitoring instrument should ideally fulfil, as well as additional non-technical criteria including the building of statistical systems, cost and data protection. Second, we examine critically the relative strengths and weaknesses of three approaches that have been proposed to collect post-2015 data in light of these criteria, namely:

### 1. Household survey instruments

- a. Large multi-topic household surveys (LSMS, DHS, MICS, national surveys)
- b. Quick interim household surveys
- c. Public opinion surveys (Gallup, World Values, Regional Barometers, Social Weather Station)

### 2. Administrative and registry data

### 3. Big Data: Satellite, marketing, internet/social media, call data records, and other so-called ‘digital breadcrumbs’.<sup>7</sup>

Third, we evaluate the diverse options that have been examined in relation to one another in the light of the ten criteria that were originally set out. The approaches are not mutually exclusive and may be combined. But the strengths and weaknesses need to be carefully understood so that they are used

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<sup>4</sup> As the SDSN initiative attests (<http://unsdsn.org/resources/publications/indicators/>).

<sup>5</sup> Southern Voices, *Unpacking the data revolution*, <http://www.post2015datatest.com/>, Paris21, *Informing a data revolution*, <http://www.paris21.org/advocacy/informing-a-data-revolution>.

<sup>6</sup> Many recent documents have compiled tremendously useful ‘Lessons learned’ from the MDG experience, such as the document by that title by IAEG (2013), as well as UN Systems Task Team (2013); ECE-ESCAP-ECLAC-ECA-ESCWA (2013).

<sup>7</sup> <http://www.economist.com/news/books-and-arts/21595883-how-re-engineer-world-measure-man-0>.

correctly, each to its best advantage. While each option has strengths, we conclude that high quality multi-topic household surveys complemented by interim lighter surveys have a demonstrated ability to collect the core indicators of human poverty at an individual and household level in a rigorous way. Such high quality and timely surveys could be supported by international agencies and/or national statistical offices, depending upon the context and capacity in 2015. New technologies are likely to aid in data collection and timely analysis.

In our view, while polling surveys have value in eliciting perceptions – vitally important in themselves – they do not appear to provide the most accurate source for objective deprivations, either directly or through subjective proxies. Administrative systems require strengthening in many countries to improve coverage and quality, but they hold the promise of providing timely and comprehensive data on some clear topics. Big Data, too, has the potential to complement traditional data collection, but it will not suffice for all indicators, and much more experimentation is needed with various forms of Big Data before it becomes part of our standard poverty monitoring tool-kit. Finally the linking data from diverse sources merits further attention.

## 2. Criteria Underlying a Post-2015 Monitoring Instrument

To begin, we propose ten evaluative technical criteria that an international monitoring instrument should fulfil.

1. **Core indicators:** Collect data on the core indicators that feature in a new agreement – both existing MDG indicators and new additions – accurately, reliably, and with relative parsimony. Indicators should be universal – equally applicable and relevant in all countries.
2. **Frequency:** Collect data frequently enough to monitor the impact of seasonality and shocks, to enable better understanding and more prompt reaction.
3. **Promptness and availability:** Clean and make available data in a timely manner; ensure files and methodologies used for measures are publicly available.
4. **Country coverage:** Maximize country coverage across all countries.
5. **Multi-topic and integrated:** Collect data of the same individuals and households to monitor the multidimensional nature of deprivation.

6. **Cross-sectional and inter-temporal comparability:** Collect data on the core indicators in a standardized way to enable comparisons within countries (e.g., regions, social groups), across countries and over time. Core indicator definitions should be harmonised with those of the SDGs.
7. **Disaggregation.** Include identifying markers of social groups– e.g., disability status, ethnicity, gender etc. – and ensure sample sizes are sufficient to permit disaggregation by these characteristics.
8. **Population coverage:** Aim at fuller population coverage, particularly for those living outside traditional households, and at being fully representative – either through sampling or complete population coverage.
9. **Intra-household analysis:** Fill data gaps within households – e.g., for older people – and permit a richer understanding of gendered intra-household dynamics.
10. **Data quality.** Maximize precision. Minimize sampling and non-sampling measurement error as well as data entry errors, data loss post collection, and so on.

Key non-technical criteria, which we touch on where possible, include the building of statistical systems, cost and the need for protecting data obtained from households and individuals.

### 3. Survey Instruments

In evaluating the contributions of surveys to monitoring the SDGs, we focus on data needs to monitor **core indicators of human poverty** that will feature in a new agreement. An illustrative subset of SDSN's 'Core' SDG indicators that reflect the July 2014 Open Working Group document<sup>8</sup> and that arise from household surveys are listed in **Appendix 1**. Naturally, given that the SDGs and their associated indicators will continue to evolve, our reflections are not tightly tied to this list, but it helpfully grounds what follows. In this section, we evaluate three survey-based potential approaches to SDG measurement: large household surveys, interim surveys and public opinion polls.

The diversity of country contexts and statistical systems must be stressed up front. There is no one-size-fits-all survey approach. A great deal has been learned from the MDG experience of using national and

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<sup>8</sup> <http://sustainabledevelopment.un.org/focussdgs.html>.  
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international household survey data together with administrative and census data for monitoring purposes, and the SDGs naturally will build upon such analyses.<sup>9</sup>

In the short term, it is likely that in some countries, SDG data collection will be undertaken in collaboration with the Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Survey (MICS), or similar post-2015 surveys and agencies. These institutions collaborate (each in slightly different ways) with NSOs and provide technical support on all steps, from sample design, enumerator training and data entry, to the release of the data and survey reports, thus effectively delivering data whilst, in some cases, strengthening statistical systems. In other countries, it is likely that the data collection and reporting will be solely led by NSOs, which may harmonise indicator definitions with those of the SDGs.<sup>10</sup>

In the longer term, there will continue to be the ongoing need for an international body to fulfil functions others have described in detail, such as a) continuous improvement of indicator definitions; b) ongoing support for questionnaire design and harmonisation; c) synthesis of data and indicators for ongoing monitoring; and d) preparing time-saving new technologies for survey data collection, entry, analysis, visualization, publication and dissemination; and e) further analysis of the possibilities of linking data from diverse sources.

### 3.1: Internationally comparable data based on household

In-depth household surveys have been the most commonly used data sources for MDG monitoring and will remain at the heart of post-2015 monitoring efforts. The internationally comparable surveys typically used to collect MDG indicators are well known and require little detailed description here. **Appendix 2** provides more information regarding the USAID-funded DHS, UNICEF's MICS and World Bank Living Standards Measurement Survey (LSMS) – our main focus in this section; other vital surveys are household budget surveys and labour force surveys. Data from national household surveys were also used when the quality was rigorous and the variable definitions, harmonised. National data have the advantage of country ownership; their development strengthens national statistical systems; and the data are used equally for national policy and international monitoring. In addition, some regional surveys have harmonised

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<sup>9</sup> For example a leading recommendation of the IAEG 2013 'Lessons Learned' was the "Development of a strong partnership between the national and international statistical systems for the production of statistics for development indicators, including the MDG indicators, and for the improvement of statistical capacity and other reporting issues." A very short schematic summary on the use of national vs international data sources is available for EU countries on <http://bit.ly/1vHKJJ>.

<sup>10</sup> A foreseeable and not uncommon difficulty will arise if the existing national indicator definition (which can be compared across time) is more appropriate to the national context than the proposed SDG indicator, in which the country's incentive to invest in collecting an additional suboptimal indicator, or replacing their indicator, is unclear.



definitions and provided on-going central support to national initiatives, such as the European Union Statistics on Income and Living Conditions (EU-SILC) in Europe, the Mejoramiento de las Encuestas de Hogares y la Medición de Condiciones de Vida (MECOVI) in Latin America, and the Pan Arab Project for Family Health (PAPFAM) in the Arab region.

At present, either international or national survey programs remain the best way of obtaining accurate and reliable internationally comparable measures of poverty across multiple dimensions – the core indicators named at the beginning of this section and other similar indicators. We first review their evident strengths and then the challenges as a sufficient monitoring instrument.

The key strengths of these initiatives lie in the wealth of knowledge the institutions conducting them bring to their design and implementation, and large sample sizes that permit a high level of measurement precision coupled with the possibility of **disaggregation** for an array of regions and potentially marginalized or disadvantaged groups.

These surveys are **multi-topic and integrated**, collecting information including demographic characteristics of the population, housing characteristics, education and employment; they may also include in-depth modules on income or consumption, or health and nutrition, as well as optional modules on aspects such as violence, domestic violence or migration. Collecting all these data for the same individuals and households is necessary to illuminate people's multidimensional experiences of poverty, including the many disadvantages that batter their lives simultaneously.<sup>11</sup> This matters for high impact policy, as such information catalyses policy responses that 'break the silos' and provide integrated responses to clustered disadvantages.<sup>12</sup> The first key message in *The MDGs at Mid-point*<sup>13</sup> – a 50-country study on accelerating progress – is that successful countries addressed different deprivations together, using multisectoral and coordinated policies. It also is vital for measures that reflect clustered disadvantages at both the national and subnational levels, such as the current Multidimensional Poverty Index (MPI) or an Early Child Development Index (ECDI).<sup>14</sup>

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<sup>11</sup> Sen (2000), Alkire and Foster (2011), Alkire and Santos (2014).

<sup>12</sup> Examples of such joined-up policy responses, which use measures to manage change, are available at [www.mppn.org](http://www.mppn.org). They include, e.g., the 'Crusade against Hunger' in Mexico, and Colombia's 'Prosperity for All' programmes.

<sup>13</sup> [http://ec.europa.eu/development/icenter/repository/mdg\\_paper\\_final\\_20080916\\_en.pdf](http://ec.europa.eu/development/icenter/repository/mdg_paper_final_20080916_en.pdf).

<sup>14</sup> The global MPI in 2014 is available for 108 countries, and for 780 subnational regions as well as for rural and urban areas in 106 countries. Data for each of the 10 component indicators, as well as for subindices such as the percentage of MPI poor people, are available online for each country and subnational region. See <http://www.ophi.org.uk/multidimensional-poverty-index/mpi-2014/>.

Household surveys implemented by motivated, appropriately trained and well-supervised enumerators are particularly suited to collecting data on topics that are complicated to measure well, such as income and consumption – which require the careful enumeration of all potential sources (job(s), cash transfers, imputed value of housing, etc.) – as well as sensitive topics like domestic violence, which require special enumerator training.<sup>15</sup>

Limitations of household surveys arise from reliance on stated preferences and on sampling. We elaborate on several of these here, as they require further research attention.

**Measurement error.** The measurement error present in household surveys (both statistical and non-statistical) has been more extensively studied than other approaches to data collection and standard statistical techniques can give insights into the reliability, validity and statistical significance of estimates. Two examples attest to the potential for error. One illustration lies in divergences with national accounting – i.e., the extent to which mean per capita consumption from household surveys deviates from the same indicator computed from national accounts. It is difficult to be clear about where the problem lies – both are prone to different types of measurement error (Deaton 2005) – though Headey and Ecker (2013) point to “indications of sizeable measurement error in household survey data from some developing countries that is largely related to the limited capacity of the statistical institutions”. Another illustration is the different responses that different ways of fielding questions elicit: a field experiment in Tanzania which tested eight alternative methods commonly used to measure household consumption among 4,000 households found significant differences that could be attributed to the reporting format (Beegle *et al.* 2012).

Measurement error may arise from well-known flaws affecting surveys, including question content, recall error, rounding and cognitive error, proxy response, intentional misreporting and respondent fatigue (Beegle *et al.* 2012). For example, households may not be able to answer questions based on past recall accurately, or find it challenging to answer hypothetical constructs such as ‘consumption in a usual month’ (Beegle *et al.* 2012). Asking for data *directly* of a proxy, such as a household head or other nominated person rather than the household member concerned, tends to yield less accurate data (Bardasi *et al.* 2011).<sup>16</sup> Intentional misreporting is a risk, either because the respondent perceives an incentive to overstate his or

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<sup>15</sup> DHS has incorporated an optional module on domestic violence in some 30 of its surveys to date, and a few questions are included in a smaller number of LSMS surveys.

<sup>16</sup> Some newer surveys are starting to address this issue – the 2010/2011 Tanzanian NPS, for example, addresses its health, labor and subjective wellbeing to ‘all respondents aged 12 years and older’ directly and the enumerator is instructed to record whether or not the response is obtained directly or by proxy. See: <http://bit.ly/1PQATE>.

her poverty – possibly on the expectation that it may yield some benefit – or conversely, to conceal it, e.g., out of shame.

Beyond measurement error, challenges for surveys include content limitations and the need to improve questions, balance coverage across and within dimensions, capture intrahousehold deprivations and enable more granular data disaggregation.

First, surveys need to capture multiple dimensions of poverty, such as a lack of services relating to health, education, and living standards, environmental degradation, assets or consumption, gender discrimination, quality of work, and violence. In addition, the MDGs drew sharp attention to some deficiencies in questions such as years of schooling, which does not proxy educational quality or achievements. Additionally, survey are often limited in scope and do not capture data on the ‘missing dimensions’ of poverty that poor people say are important, such as violence, informal and unsafe work, disempowerment, shame, humiliation and isolation, and a lack of psychological well-being.<sup>17</sup>

Even where surveys are comprehensive in outlook, survey designers face trade-offs in content. The well-known gaps in the MDGs and a reliance on modelled data for a number of indicators attest to these limitations.<sup>18</sup> A key trade-off arises in terms of the decision regarding whether to focus on health or on income/consumption, with surveys tending to favour one or the other. For example, LSMS surveys collect limited information on health status, relying on self-reported information rather than trained observation; also sample sizes tend to be relatively small and thus do not allow calculating disease-specific measures of health such as levels of coronary heart disease, cancer or maternal mortality (Gertler, Rose and Glewwe 2000, p. 184). Moreover, very often, anthropometric questionnaires – although recommended as core – are not included in LSMS surveys, nor is the fertility module. DHS or MICS surveys on the other hand usually have larger sample sizes and collect data that can be used to study a wide range of health problems, including rare events (Gertler, Rose and Glewwe, 2000, p. 184). Yet, they rarely collect information on income or consumption and expenditure.<sup>19</sup> One positive way forward on this, which we discuss below, would be a continuous survey setup, in which data could be collected over more than one household visit.

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<sup>17</sup> See OPHI ‘Missing Dimensions’ research programme, <http://www.ophi.org.uk/research/missing-dimensions/>.

<sup>18</sup> In 2011, of the 19 countries of East Asia and the Pacific, data on malnutrition was available for only one of them (ESCAP). Actual data on malaria prevalence is available for 15% of all deaths and vital systems data on maternal mortality for 16% of all births (<http://bit.ly/1rfv1KR>).

<sup>19</sup> There are exceptions to both: for example Nepal’s recent LSMS (NLSS) collects data on both consumption and malnutrition, as does Uganda’s DHS.

The emphasis on collecting the bulk of data from a single household member – often, the head, or in the case of DHS, a woman of reproductive age – risks overlooking **intrahousehold inequalities**. One potential exclusion is the systematic neglect of some groups; for example, older people who are ‘non-eligible’ for many variables of interest such as the nutritional status of children and women in reproductive age. Another is gender inequalities. But surveys can readily be adapted to record the responses of more than one household member, and, given the wealth of evidence on gender-based inequalities, gendered data should become the norm. Cost considerations are not prohibitive – experiments with the Women’s Empowerment in Agriculture Index (WEAI) have shown, for a much longer survey instrument, that the incremental cost of interviewing a second person in the household is far less than ‘double’ because if the survey team are already in the cluster, they can interview the other member during their stay.

**Data disaggregation** varies greatly. Nearly all surveys can be disaggregated by rural-urban regions; some can be decomposed by subnational regions; others to more local levels such as districts or municipalities. Disaggregation can be constrained by group size, especially where groups of interest may be relatively small, for example, people with disabilities. Even where initial sample sizes are large, when adding additional ‘filters’ – e.g., elderly women, or girls from a remote ethnic minority – samples can quickly dwindle to such small sizes that it becomes very challenging to make any reliable inferences. Oversampling can compensate for key groups – but the larger the sample, the more costly and difficult it becomes to secure high quality data. Pooling data across time is another possibility, but sample sizes may remain small. It was estimated to require at least eight years of survey data to obtain reportable estimates for some population subgroups in the US National Health Interview Survey.<sup>20</sup>

Through sampling, household surveys aim to provide a representative snapshot of how a population is faring; however, they are limited in their **population coverage**, in that they typically exclude ‘by design’ certain groups such as homeless people, pavement-dwellers, institutionalized groups (e.g., imprisoned people, the military, members of religious orders and those in hospital or residential care facilities), and mobile, nomadic, or pastoralist populations (Carr-Hill 2013). In practice, other hard-to-reach populations are under-represented. Together, the number of excluded people is estimated to reach at least 250 million worldwide (*ibid.*). At best, therefore, household surveys only convey information about people in private households.

International survey programmes have included a significant number of developing countries, although **country coverage** is not yet exhaustive. DHS and MICS cover nearly 115 developing countries – out of

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<sup>20</sup> <http://www.ahrq.gov/research/findings/final-reports/iomracereport/reldata5.html>.  
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the approximately 140 countries the World Bank classifies as developing.<sup>21</sup> LSMS cover 28 countries to date.<sup>22</sup> When we incorporate issues of **frequency** – namely the cost and complexity that impede frequent administration of these surveys, substantial populations are excluded from regular data collection. For example, of the 49 countries in Sub-Saharan Africa, only 37 countries, covering 94% of the population of Sub-Saharan Africa, have survey results available from the past seven years (2006-2012). Small-island developing states (SIDS) are particularly at risk of exclusion. For example, of the 52 SIDS, whose populations total 65 million, only 17 have income poverty information available.<sup>23</sup>

Although not free from problems, traditional survey instruments are a strong means to capture a core set of post-2015 indicators on human poverty and can be linked to satellite, administrative, and other data sources when required (see also Section 4). To monitor indicators that are likely to change quickly such as income or consumption poverty, or nutritional status, more frequent data are needed. This suggests a need to supplement these surveys – either with a lighter, more flexible interim survey or by moving to permanent teams of enumerators (i.e., continuous surveys). Next, we consider two ‘interim’ survey options: 1) light household surveys, such as the Multidimensional Poverty Peer Network (MPPN) proposal, focused on a reduced sample and selected indicators and 2) public opinion surveys. We favour the former.

### 3.2 A short, powerful survey with national and international indicators

A common shortcoming of both national and international household surveys is periodicity. The DHS and, until recently, MICS surveys are normally fielded every five years though MICS surveys are moving, where possible, to being fielded every three years. Similarly, household budget surveys are rarely fielded more than every three to five years – and often less so.

The aim to increase the periodicity and timeliness of household surveys is longstanding; unsurprisingly, various methods have been attempted. They have had mixed results, yet these experiences – both negative and positive – are instructive. This section introduces various experiences related to brief and frequent

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<sup>21</sup> The Bank classifies 139 countries as developing. DHS reports datasets from 90 countries (<http://dhsprogram.com/Where-We-Work/Country-List.cfm>), and MICS, from close to 30 ([http://www.childinfo.org/mics\\_available.html](http://www.childinfo.org/mics_available.html)). Both were accessed on 30 August 2014.

<sup>22</sup> <http://bit.ly/1qPxP12>.

<sup>23</sup> <http://unohrrls.org/custom-content/uploads/2013/09/Small-Island-Developing-States-Factsheet-2013-.pdf> accessed May 2014.

surveys, then draws attention to the MPPN survey modules, which were developed as a concrete way of reflecting some SDG indicator proposals.<sup>24</sup>

Many countries have annual or more-than-annual survey instruments in place for some core indicators of human poverty. For example, Colombia, reports income and multidimensional poverty annually and Mexico does so every two years. Indonesia's SUSENAS reports consumption poverty estimates twice per year and Ecuador has an annual survey with updates every trimester. Indonesia, Ecuador, and other countries, including Brazil,<sup>25</sup> have what can be called 'continuous household surveys' in that the different surveys are drawn from a master sample, can be aggregated for more in-depth disaggregation, and may have a panel element. It also means that the survey teams are in the field more or less continuously with different surveys and modules, so data quality and availability increases in a way that is cost-saving and coordinated. In addition to continuous national household surveys, a 'continuous DHS' is implemented in Peru and in Senegal.

Even without formal 'continuous' household surveys, national data are often very frequent. Indeed, a total of 42 countries, both developed and developing, appear to have income poverty data for at least five consecutive years between 2002 and 2012.<sup>26</sup> For example, India's National Sample Survey (NSS) provides annual updates of consumption poverty, with a large round for greater disaggregation roughly every five years. Pakistan's Social and Living Standard Measurement Survey (PSLM) also fields annually, alternating district- and province-level disaggregation potentials and also alternating modules. And the EU-SILC provides close to annual updates of the EU-2020 poverty and social exclusion indicators – including being at-risk-of (relative) income poverty. However the national surveys are not comparable to one another. Furthermore, they focus primarily on consumption/expenditure or income data and omit most other core indicators of human poverty (AAJ) (Alkire *et al.* 2014).

International initiatives to generate more frequent data, conversely – namely the DHS Key Indicators Survey (KIS) and Interim DHS and World Bank's Core Welfare Indicator Survey (CWIQ) – have experienced lower adoption as stand-alone surveys than might have been expected (Alkire 2014). These examples draw attention to the need to understand clearly the 'demand' and 'inhibitions' to shortened surveys before embarking too far down this road. However there are also positive examples of surveys

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<sup>24</sup> This section draws freely upon the background paper Alkire (2014), which elaborates this topic somewhat more. The MPPN survey module is separately available [online](#) and as MPPN (2014).

<sup>25</sup> Brazil's PNAD has become a continuous national household sample survey:  
[http://www.ibge.gov.br/english/estatistica/indicadores/trabalhoerendimento/pnad\\_continua/](http://www.ibge.gov.br/english/estatistica/indicadores/trabalhoerendimento/pnad_continua/).

<sup>26</sup> Computed from World Development Indicators (2013).

which blend monetary poverty data with a limited set of social and living standard indicators (although overlooking health), which are comparable and which are annually updated.

One noteworthy and rich example for the SDG discussions are the MECOVI surveys in Latin America, which have developed harmonised data on 24 Latin American and Caribbean countries for the analysis of poverty and inequality. In many but not all countries, new surveys are fielded annually.<sup>27</sup> Launched in 1996 and ongoing to this day, MECOVI sought to increase the capacity of the national statistical systems, whilst providing timely and comparable data on key economic, social and living standards indicators. In partnership with the World Bank IBRD and CEPAL, a research centre, CEDLAS, at the University of La Plata, provides support in harmonisation and comparative analysis, including preparation of the SEDLAC database. This programme is longstanding and thoroughly evaluated, so provides a rich resource for present conversations.

Another nearly annual harmonised dataset covering nearly 30 countries is EU-SILC. Perhaps a distinctive contribution of this experience has been the **open method of coordination**, which balanced national priorities with progressive harmonisation of data and targets.

The open method of coordination, which is designed to help member states progressively to develop their own policies, involves fixing guidelines for the Union, establishing quantitative and qualitative indicators to be applied in each member state, and periodic monitoring (Atkinson *et al.* 2002, 1–5).

The national and coordinated initiatives reviewed thus far build on tried and tested survey methodologies. In some cases, newer technologies are in use, but by no means in all. But new technology has made it possible to extend the reach and speed up the availability of the data, creating a veritable ‘revolution’ indeed (Prydz 2014).

Another bottleneck that these new initiatives are addressing is survey length. In particular, a standard consumption/expenditure module provides a wealth of information on topics ranging from consumption patterns to dietary diversity, to the percentage of income spent on various items, to inequality and distributional issues. However interim annual income and expenditure surveys may be used primarily to determine whether or not an individual is income poor. Therefore, shorter modules and other methods to

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<sup>27</sup> Details by country are available on: <http://sedlac.econo.unlp.edu.ar/eng/statistics-detalle.php?idE=28>.  
OPHI Working Paper

obtain this poverty status – leaving time and space in surveys to address other core indicators of the SDGs – are under investigation.<sup>28</sup>

In terms of **promptness and availability**, survey programmes have made some important advances, particularly given the more widespread use of Computer-Assisted Personal Interviewing (CAPI) and cloud-based technology. CAPI, developed by the World Bank, has a number of features that bolster efficiency and accuracy. The immediate transfer of data to central offices permits their ready analysis. Moreover, such technology is linked with fewer coding errors (as the programme can query errors); enables last minute updates or corrections to questionnaires; permits dynamic questionnaires (e.g., that enable experiments or asking particular questions based on previous responses); lets respondents answer sensitive questions directly without being witnessed; and enables more efficient enumerator management.<sup>29</sup>

A final note concerns the promptness and availability of the SDG indicators' publication and construction themselves. Often there is a great silence after data collection has closed before the data are released – a gap the CAPI-cloud technology could shrink. Yet there is a second delay before the release of official statistics based on those data. Some pioneering examples are worth considering. **Mexico's** lead institution on poverty measurement and monitoring, CONEVAL, obtains data from ENIGH (Encuesta Nacional de Ingresos y Gastos de los Hogares). By their own presentations, they claim to prepare the official multidimensional poverty statistics (which include income poverty) nationally and by state two weeks after receiving the cleaned data.<sup>30</sup> Moreover, without great delay the programmes used for calculating poverty are made publically available in STATA, SPSS and R languages, together with a technical note, on the CONEVAL website.<sup>31</sup> Thus academics and technicians can run the programme on the microdata set (which is also publicly available) to understand and verify the national poverty estimations, and to study and further analyse them.

These examples serve to suggest that a short, powerful survey focused on key indicators could enable updating data on core indicators of human poverty efficiently and frequently in years in which extensive surveys are not fielded, or in conjunction with rotating modules. To ensure both comparability and national specificity, a brief, multi-topic survey could include indicators on the key poverty-related goals

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<sup>28</sup> An interesting example called 'SWIFT' is underway at the World Bank – see <http://www.worldbank.org/en/topic/poverty/brief/high-frequency-data-collection>.

<sup>29</sup> <http://bit.ly/18zFbCM>.

<sup>30</sup> Presentation by CONEVAL, Salamanca, 2013; confirmed by personal conversation with Gonzalo Hernandez Licona, President of CONEVAL.

<sup>31</sup> <http://www.coneval.gob.mx/Medicion/Paginas/Medici%C3%B3n/Programas-de-Calculo.aspx>.



identified by the post-2015 development discussions and allow space for nationally chosen questions. The survey could be conducted using different institutional arrangements in different contexts, with different statistical aspirations, capacities, and ownership profiles. It could provide a rigorous way of obtaining disaggregated data on core issues, particularly those that are subject to frequent change, and could potentially incorporate rotating modules that focus on particular topics.

This new survey instrument must be short, powerful and selective so it can be conducted frequently – i.e., every year. The sample surveyed should be representative of the key regions or social groups and should provide household level and gendered data.

Such a core questionnaire should not cover all post-2015 targets. Some indicators may require specialised surveys; some may not require frequent updates; some may be sourced from community, administrative or census data; and some complex indicators may take too long to collect. Focus is essential. As the Italian proverb puts it, ‘often she who does too much, does too little.’ Yet such a survey could yield poverty data that provide profound insights into the profile of disadvantages poor people experience and the impact of poverty reduction programmes, bolstering the design, targeting and monitoring of future policy interventions. It is not the only tool required for a data revolution, but without such a tool, it is hard to envisage lasting change.

The sample design and survey modules proposed by the MPPN<sup>32</sup> provide one concrete option for such a survey instrument. This survey instrument has been built to reflect key draft SDG indicators under 12 goals, and has been modified and assessed by many actors. It would naturally be modified to reflect the final core indicators of human poverty in the SDGs and other agreements that emerge during the process.

### 3.3: Public opinion surveys

A third survey-based option we consider to obtain frequent poverty estimates is a public opinion survey along the lines of the Gallup World Poll (2006-present), World Values Survey (1980-present), Regional Barometers (from the mid-1990s on, depending on the region) or the Philippines’ long-standing Social Weather Station (1974/5-present). Such surveys have a long pedigree, dating back to the 1930s, when Gallup first introduced them. They are typically associated with the collection of subjective data, data that

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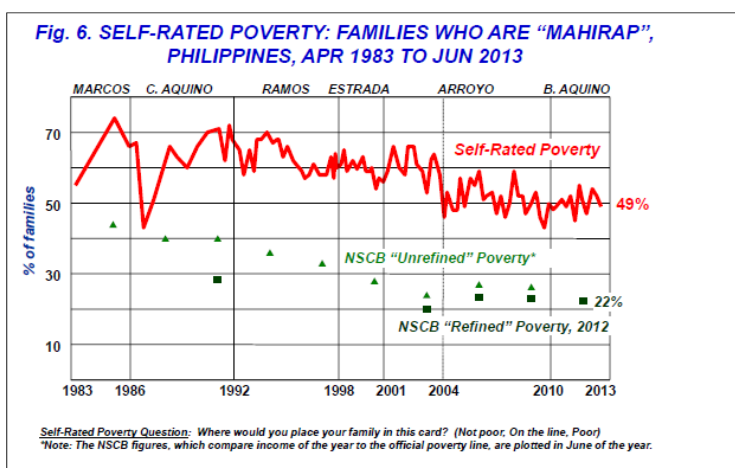
<sup>32</sup> [www.mppn.org](http://www.mppn.org). Launched in June 2013, the MPPN is a South-South initiative that supports policymakers to develop multidimensional poverty measures. It promotes the use of such measures for more effective poverty eradication efforts at the global, national and local levels. The survey instrument has been jointly developed by MPPN members, and the newest version (Sept 2014) is on <http://www.ophi.org.uk/mppn-and-ophi-propose-light-powerful-household-survey-for-post-2015/>.

‘hold the promise of delivering not just a good measure of quality of life per se, but also a better understanding of its determinants, reaching beyond people’s income and material conditions’.<sup>33</sup>

In our view, their potential lies in offering a valuable source of alternative and complementary data, particularly relating to people’s perceptions and values. But we argue that polling surveys ought not to be used as a standalone source for poverty measurement, for reasons ranging from the inherent difficulty of measuring key indicators quickly and accurately, to drawbacks in respondent selection, to limited scope for disaggregation and the neglect of intrahousehold concerns. We elaborate upon the advantages and limitations in turn.

A signal advantage of certain public opinion surveys is their **country coverage**. As of 2012, for example, Gallup World Poll had been fielded in 160 countries and was being fielded annually in 93 of them.<sup>34</sup> The ability to field national public opinion surveys **frequently** at a relatively low cost affords a unique opportunity to capture variations in people’s perceptions – useful in gauging how these evolve over time and potentially serving as an ‘early warning system’ in times of crisis. One exemplary example is the Social Weather Station, which has asked Filipinos to self-report their poverty at regular intervals for over 30 years (Figure 1). Two aspects stand out. The first is that while self-reported poverty and official poverty statistics differ greatly in terms of levels, the trends they describe are broadly consistent. The second is the considerable variation characterizing the periods between the official poverty estimates.

Figure 1: The advantage of frequent public opinion polling



Source: Mangahas (2013).

<sup>33</sup> Stiglitz, Sen, Fitoussi (2009), p. 16.

<sup>34</sup> <http://www.gallup.com/poll/151595/Gallup-Survey-Frequency-Country-2012.aspx>.  
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Public opinion surveys must ask questions in a way that they can elicit a quick response. When applied to objective **core indicators** of poverty, this approach may yield two types of **measurement error**. The first derives from fielding one or a small number of questions to elicit complex constructs, like income or consumption, and by relying on enumerators who may not have specialized training. The second concerns the potential misuse of perceptual data to monitor objective deprivations. We explore each issue in turn, using examples from the Gallup World Poll (GWP).

### 3.3.1 *Validity and reliability in measuring objective deprivations*

The measurement of income poverty illustrates some issues that arise when using public opinion polls to estimate objective poverty measures. To estimate income poverty headcounts, GWP asks respondents to report their income in one of two ways.<sup>35</sup> First it asks the respondent to report their total monthly pre-tax income in an open-ended manner. Respondents who are unwilling or unable to do so are asked instead to place themselves in one of ten income categories denoted in local currency units. Gallup imputes income measures for the 20% of respondents who do not provide any income information and then converts the local currency measures to international dollars using the PPP conversion factor.

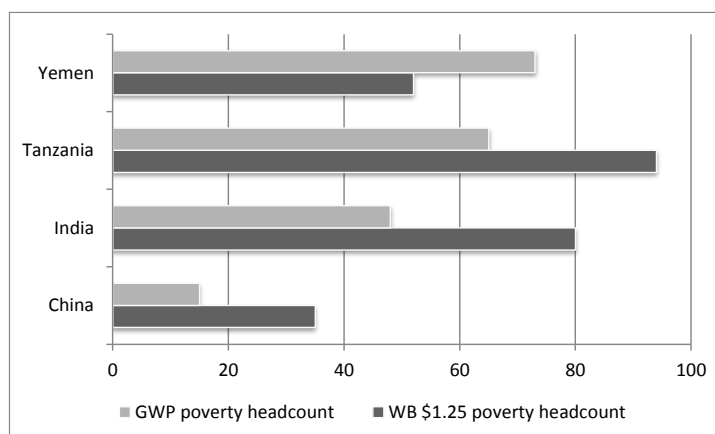
There are reasons to question the validity of this approach. First, it is very difficult to get accurate information from large parts of the population in many countries, not least those working in subsistence agriculture and the self-employed (Deaton in Grosh and Glewwe 2000). In the end, the accuracy will vary greatly depending on the ingenuity of the enumerators and the uniformity of their approach. For this reason, there is a preference in most of the developing world (excluding Latin America) to measure consumption rather than income poverty. Gallup research justifies its income poverty estimates in part because of their high correlation with those of the World Bank and other official sources, for example, a correlation of 0.92 between its estimate of \$2.00 per day poverty and that of the Bank. However, closer scrutiny of the data suggests this may be an artefact of weighting countries equally rather than by their respective populations – not least because Gallup estimates for China are less than half those of the World Bank and those for India deviate by over 30 percentage points from official figures (Figure 2).<sup>36</sup>

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<sup>35</sup> Gallup World Poll Poverty Estimates, May 2014.

<sup>36</sup> It is not possible to calculate the correlation between the series accounting for population weights because Gallup does not make its full series of \$2.00 per day estimates publically available.

Figure 2: Comparison of World Bank and Gallup World Poll poverty headcount rates in selected countries



Source: Gallup World Poll Poverty Estimates (2014) and [www.povcal.net](http://www.povcal.net).

Even in Latin America where income poverty measures are more common, quick estimates of income and income poverty may not be very accurate. Gasparini *et al.* (2008) compare estimates from Gallup World Poll and national household surveys in Latin America and the Caribbean using mostly 2006 data for 21 countries in the region. Five key differences are relevant here. First, incomes recorded by Gallup were lower than in national household surveys (except in Venezuela) – on average the mean (median) income was 66% (77%) of the value in the household surveys. The linear correlation between per capita income in GWP and national household surveys was positive and significant but not high (.64), even when deleting the main outliers (Honduras and Venezuela). Second, income changes between 2006 and 2007 in Gallup data did not match those from national accounts – mean income in PPP USD increased 46% in the region as a whole according to Gallup data, an unrealistic estimate that was not driven by any changes in the questionnaire. Third, on average, poverty in GWP was 16 percentage points higher than in national household surveys when using the \$2 per day line. The linear coefficients were .59 for LAC and .86 when the Caribbean is excluded (and .92 when both the Caribbean and Venezuela are removed). Fourth, income inequality measured using Gallup data was lower than in national household surveys, possibly due to the omission of some relevant income sources for non-poor groups. Fifth and finally, non-monetary indicators also differed between the sources – Gallup estimates of home ownership in Honduras and Nicaragua (the only countries where it was collected) were nearly 10 percentage points higher than in their national household surveys. The correlations for measures of water and electricity access and telephone and computer ownership were high across countries, but far from perfect.

One possible reason for these types of errors concerns the choice of respondent. Respondents to polling surveys – on both individual and household characteristics – are typically a single household member over 15 years old. Gasparini *et al.* (2008) suggest this may not always be the respondent who is most

knowledgeable about household income flows, and this may help to explain the mismatch between Gallup income estimates and national household surveys in several countries.<sup>37</sup>

### 3.3.2 Use of perceptual data to proxy objective deprivations

A second possible problem arises in relation to the potential use of perceptual data collected at the individual level in household surveys to proxy objective deprivations. A recent review by Jahedi and Mendez (2014) points to systematic biases in subjective reporting arising from question ordering, scale and halo-effects,<sup>38</sup> psychological factors,<sup>39</sup> and macroeconomic fluctuations, among others. It has also been shown that subjective measures are uncorrelated – and even negatively correlated, with objective measures for certain variables.<sup>40 41</sup> Subjective measures are also difficult to aggregate and to interpret because they are expressed on an ordinal scale.<sup>42</sup> Because the collection of subjective indicators in household surveys is relatively recent, having only gained momentum in public policy in the past few years, greater validation efforts are needed. Relatedly, cultural and linguistic differences in the construction and interpretation of these indicators require consideration.<sup>43</sup> A final concern relates to the concept of adaptation, broadly defined as “any action, process or mechanism that reduces the effects of a constant repeated stimulus”.<sup>44</sup> Two forms of adaptation have been identified – resignation when confronted with difficult life circumstances and hedonic adaptation to improvement in life circumstances.<sup>45</sup> Amartya Sen has dwelt on the consequences of the first type of adaptation, arguing that deprived individuals can cope with difficult

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<sup>37</sup> Income poverty is not the only area where more validation may be needed. To estimate victimization, Gallup World Poll asks the question “Within the past 12 months, have you been assaulted or mugged?” (see <http://bit.ly/1AfMwiU>). Wolf et al. (2014) comment that “data on the validity and reliability of this questionnaire is not available” (p. 222). Data on self-reported assault from GWP from 2010 and from 2009/10 data from International Crime Victimization survey were found for just eight OECD countries. The rank order correlation among the set of responses was 24, suggesting further investigation is warranted.

<sup>38</sup> Podsakoff *et al.* (2003).

<sup>39</sup> A set of experiments has shown that simple manipulations can affect how people process and interpret questions. One first interesting manipulation comes from the ordering of questions. A second issue is that prior questions may elicit certain memories or attitudes, which then influence later answers. See Bertrand and Mullainathan (2001).

<sup>40</sup> Several studies point to this result. For an example, see Razafindrakoto and Roubaud (2010) and Jahedi and Mendez (2014).

<sup>41</sup> Some evidence points to a correlation between objective and subjective indicators. For example, in a study of corruption in Indonesia, Benjamin Olken finds that villagers’ perceptions of corruption do appear to be positively –though weakly, correlated with the more objective indicator (missing expenditures). But for some village-level characteristics, using perceptions to measure corruption can produce very different answers from the results obtained using a more objective measure of corruption. See Olken (2009).

<sup>42</sup> Rose-Ackerman (1999), Jahedi and Mendez (2014).

<sup>43</sup> Matthias Großmann, Maya Schnell, “Personal Perceptions Make a Difference,” Development and Cooperation, accessed June 11, 2014, <http://www.dandc.eu/en/article/why-subjective-indicators-development-are-meaningful>.

<sup>44</sup> Fredrick and Loewenstein (1999).

<sup>45</sup> Clark (2012).

circumstances by learning “to take pleasure in small mercies” and by reducing desires to more realistic proportions in order to avoid disappointment.<sup>46</sup> If individuals undergoing hardship have largely adapted to their conditions, subjective indicators may not necessarily reflect objective life circumstances.

Headey (2013) and Headey and Ecker (2013) have explored in detail self-reported measures of food security – such as the Gallup World Poll question which asks whether respondents had experienced problems affording food over the previous 12 months.<sup>47</sup> This type of question is not without value, they argue, in capturing ‘psychological dimensions of food insecurity’, which are inherently interesting and useful in gauging future expectations, e.g., in sentinel surveys (pp. 335–336). They also point to the relatively low cost of such data, especially compared to traditional measures of poverty and caloric consumption and suggest that subjective recall questions can be a relatively efficient way to capture seasonality. But they also point to several concerns:<sup>48</sup>

1. *Ordering of questions induces bias.* Question ordering in a high frequency Gallup poll of US citizens had a larger influence on self-reported well-being than the recent financial crisis and had a large effect on self-reported food insecurity in China.<sup>49</sup>
2. *Reference frames differ, impeding interpersonal comparability.* For food security, “variety” for a poor person may involve eating animal-sourced products one a month, but for a wealthy person it may involve eating these products once a day.<sup>50</sup> Self-reported food insecurity was found to be surprisingly high in some middle-income countries with exceptional educational attainment, including Sri Lanka and several Central Asian countries.<sup>51</sup> Married men and married women in similar situations were found to respond differently to food security questions,<sup>52</sup> while adolescents’ self-reported food security was shown to differ from their parent’s proxy reports.<sup>53</sup>
3. *Intentional misreporting.* Food insecurity may be underestimated owing to feelings of shame arising from admitting to hunger or fear, notably in authoritarian political contexts, and, conversely,

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<sup>46</sup> Sen (1990, 1992).

<sup>47</sup> The Afrobarometer and CWIQ surveys, among others, have also asked respondents to self-report their food security (Headey and Ecker 2013, p. 335).

<sup>48</sup> Headey and Ecker (2013), p. 336.

<sup>49</sup> Deaton (2011) and Headey (2013) respectively, cited in Headey and Ecker (2013), p. 336.

<sup>50</sup> *Ibid.*

<sup>51</sup> Headey (2013), cited in Headey and Ecker (2013), p. 336.

<sup>52</sup> Matheson and McIntyre (2013).

<sup>53</sup> Nord and Hanson (2012).

overestimated where people perceive a material incentive to classify themselves as food insecure (e.g., to benefit from public transfers).

The authors correlate subjective food security measures with objective measures in Cambodia, Malawi and Ethiopia. For Cambodia and Malawi, the strongest correlation they find is .25, (with household expenditure), while for Ethiopia, that same measure was -.04).

Public opinion polls may have limited value as a source of post-2015 data on objective deprivations for other reasons too. Because they do not collect information from other members or multiple members within the household, they cannot reflect **intrahousehold dynamics**. Moreover, owing to small sample sizes (generally  $N \sim 1000$ ), limited **disaggregation** is generally possible. Mostly, samples can be disaggregated by rural/urban zone and by gender – though the standard error tends to be fairly high ( $\sim \pm 5$  percentage points) for these subgroup estimates. Finally, where surveys are implemented by private companies, the sample design is not always entirely clear, nor are the micro data typically available to users for purposes such as estimating standard errors or multidimensional poverty measures that reflect the joint distribution of deprivations.

#### 4. Beyond household surveys: Administrative and Big Data

The next approaches to collecting post-2015 monitoring data go beyond household surveys to consider other sources. We first evaluate the potential of administrative data such as civil registration and vital statistics systems, and then that of Big Data. A key advantage these data sources often offer is the potential to go beyond the limitations wrought by a reliance on sampling – and the associated error – and on a sampling frame consisting exclusively of private households. However, each has limitations. In many countries, administrative data are incomplete and of poor quality; attention is needed to improve the underlying systems so that they can become a reliable data source. Their development also offers the potential to strengthen relevant institutions and service delivery. Meanwhile experiments in validating various types of Big Data show that despite considerable potential, additional work is needed before they can become regular parts of a poverty monitoring tool-kit. Moreover, taken alone, these approaches give an incomplete picture of poverty: to understand how the various dimensions of poverty jointly affect individuals and households, it is necessary to link data sources at these levels. This type of exercise is still in the early stages and requires further study.

## 4.1 Administrative data

Administrative data are collected typically by a government department or agency as a by-product of routine administrative purposes (e.g., register of people, customs, administration of a social benefit, etc.) as opposed to research or statistical purposes.<sup>54</sup> One prominent example of administrative data is population registers which are constructed through civil registration systems (UN, 2001).<sup>55</sup> Such registers consist of an inventory of each member of the resident population of a country augmented continuously by current information on vital events, which may include, for example: live births, deaths and foetal deaths, adoptions, legitimations, recognitions, marriages, divorces, separations and annulments of marriage; they also collect information on change of name and change of residence (UNSD, 2001).<sup>56</sup>

At the moment, countries vary in terms of the extent and accessibility of their administrative records. Northern European countries (Sweden, Norway, Finland, Denmark, and the Netherlands) as well as Japan have a long history of extensive registers and have promoted advances in the use of administrative records for statistical purposes (Mather, 2007). A distinctive feature of registration data in these countries is that all the demographic events are registered in one unified central government office instead of separate registration systems for births, deaths and marriages (Mather, 2007.). Other European countries as well as North America, Australia and New Zealand also use administrative records to different degrees (Trewin, 2010).

Use of administrative data to estimate poverty and living conditions is not yet common. Exceptions are mostly found in developed countries – for example, Denmark and Netherlands measure poverty based on ‘various administrative data relating to income (gross and net) from tax records, security benefits, disposable income, education, costs of living, housing situation, net housing cost, demographic, family and household characteristics, economic and social status’.<sup>57</sup> Such datasets can also be used to validate

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<sup>54</sup> Trewin (2010) argues that while the custodian of this type of data is usually the corresponding government department or agency, this may change in the future. “The increasing number of electronic transactions opens up new possibilities for using administrative data for statistical purposes. The custodians of some of these data sources may come from the private sector” (Trewin, 2010, p. 1).

<sup>55</sup> Civil registration is defined as the continuous, permanent, compulsory and universal recording of the occurrence and characteristics of vital events pertaining to the population as provided through decree or regulation in accordance with the legal requirements of a country (UNSD, 2001, p. 50).

<sup>56</sup> Population registers are one fundamental source of information (alongside other administrative sources as well as censuses and surveys) to construct what is called a national vital statistics system. For further details on vital statistics systems, see UNSD (2001).

<sup>57</sup> <http://unstats.un.org/unsd/methods/poverty/pdf/Chapter-6.pdf>, p. 230.



survey-based analysis; Ravallion and Sen (1996), for example, questioned household survey poverty results in Bangladesh using data on agricultural yields and prices provided by the Ministry of Agriculture.<sup>58</sup>

In the developing world, civil and vital registration systems have developed much more slowly and are used less than other sources of data for MDG reporting.<sup>59</sup> Just one quarter of countries in South Asia, less than half of countries in Latin America and the Caribbean and less than 6% of those in sub-Saharan Africa have complete civil registration systems,<sup>60</sup> and progress has stagnated; Chan *et al.* (2010) comment: “In recent decades, there has been virtually no progress made in improving birth and death registration globally”.<sup>61</sup>

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<sup>58</sup> Cited in *op. cit.*, pp. 230–231.

<sup>59</sup> <http://www.oecd.org/dac/POST-2015%20P21.pdf>.

<sup>60</sup> <http://go.worldbank.org/QVSQM1R6V0>, cited in *ibid.*

<sup>61</sup> <http://bit.ly/1qS7Wh1>, cited in *op. cit.*

With the increasing implementation of poverty reduction programmes, especially conditional cash transfers (CCTs), it has become common for countries to develop a national registry of programme beneficiaries, quite often an *integrated* registry of beneficiaries of the different social programmes. These databases are constructed initially with census and household survey information but then verified by visiting every household in the areas of interest and collecting information on the variables defined for programme targeting and sometimes also other variables of interest which may serve to evaluate programme impact (Box 1).

In developing countries, CCT registries have been used increasingly for research purposes, either relying on administrative data alone or ‘matching’ such data to household surveys to establish how beneficiaries of a particular CCT compared with the larger population.<sup>62</sup>

The use of administrative records has received significant interest as an alternative to traditional survey data

### Box 1 – Examples of CCT Registry Usage:

CCT registries are increasingly used for impact evaluation as the following examples attest:

*Familias en Acción* in Colombia (2003–2009). Baez and Camacho (2011) draw on a panel of household surveys, a census of the poor and administrative data (both the programme database, and registration numbers and results from a national standardized test). They use matching techniques to establish the effect of the intervention (household survey and administrative data) and research design that exploits differences between the means-tested eligible population and those who lie just above that threshold (census data and programme database).

Commenting on this research, Rawlings (2013) observed: ‘Linking all these data gave researchers answers in just six months at about one-fifth of the cost of an impact evaluation that would require traditional primary data collection’.

*Effects of school based management in Philippines* (2003–2005). The intervention is analysed using available administrative data on student test scores, exploiting a multistage roll-out (Khattari et al. 2010).

*Randomized Control Trials in five US settings* – ranging from criminal justice to child welfare to community parenting interventions to teacher incentives.<sup>1</sup> The Coalition for Evidence-based Policy (2012) points out that the biggest cost of an RCT is typically data collection and where administrative data already collected for other purposes, such as student test scores, criminal arrests, health care expenditures, can be used, costs can be dramatically reduced.

<sup>62</sup> <http://bit.ly/1namUwW>

collection, notably in Europe.<sup>63</sup> Moreover, the Inter-Agency and Expert Group on MDG indicators raised a concern that administrative data were not used effectively despite their potential to generate many MDG indicators.<sup>64</sup> The range of potential indicators from administrative data can include not only inputs and costs, but also outputs and even outcomes.<sup>65</sup>

There are important advantages. Administrative data have the potential to be collected with greater **frequency** than household surveys. Often, sample sizes are extremely large, enabling smaller error and more complex research designs, while many are censuses of the population of interest and therefore, in theory, achieve full **population coverage**. This also means that results can be presented at various levels of **disaggregation** – e.g., by geographical location, age and/or gender<sup>66, 67</sup> Further, administrative data have the benefit of less attrition over time because administrative systems are more successful in tracking individuals than survey organizations.<sup>68</sup> Non-response and measurement error may also be less of a problem where systems are functioning well.<sup>69</sup> The use of administrative data implies a lower cost of data collection, as the data is being collected for other purposes. Finally, use of register data decreases the burden on respondents,<sup>70</sup> and may potentially lower non-response rates.<sup>71</sup>

Alongside these potential advantages are some serious limitations. In most developing countries, administrative data remain underutilized “because of their poor quality as a result of incomplete coverage, biased reporting and other data quality issues”.<sup>72</sup> **Quality can be questionable** owing to varying institutional capacities and protocols, and **data may not be publically available** or organized in such a way that it can be easily analysed.<sup>73</sup> National legislation may impede access to registry data, necessitating tedious administrative procedures to obtain access and, in some cases, access to the data may be restricted

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<sup>63</sup> Calderwood and Lessof (2009:55).

<sup>64</sup> United Nations 2007, cited in <http://bit.ly/WpBsmg>, p.5.

<sup>65</sup> *Op. cit.*

<sup>66</sup> <http://bit.ly/WpBsmg>, p. 5.

<sup>67</sup> Calderwood and Lessof (2009), p. 56.

<sup>68</sup> *Ibid.*, p. 57.

<sup>69</sup> <http://eml.berkeley.edu/~saez/card-chetty-feldstein-saezNSF10dataaccess.pdf>.

<sup>70</sup> Sakshaug and Kreuter (2012), p. 121.

<sup>71</sup> Jäntti, Törmälehto and Marlier (2013).

<sup>72</sup> <http://bit.ly/WpBsmg>, p. 5.

<sup>73</sup> Information in this paragraph is largely drawn from: <http://bit.ly/1namUwW>.

or prohibited altogether.<sup>74</sup> Relatedly, **confidentiality** and privacy protection could also present barriers.<sup>75</sup> The use of registers may **impede timeliness** due, first, to late data delivery by data owners and, second, to burdensome practices that are necessary to ensure consistency.<sup>76</sup> Some administrative data, particularly that derived from CCT management systems, may pertain to the beneficiaries of a specific programme rather than the household and often do not include non-beneficiaries.<sup>77</sup> More broadly, administrative data tend to be **provided discretely** for particular indicators; therefore it becomes difficult to understand how indicators and dimensions of poverty are linked at the individual and household levels. The change from survey data to administrative data can also affect cross-national and inter-temporal comparability. More specifically, it could create breaks in data series, with risks for policy monitoring.<sup>78</sup>

One way to address this problem is to link between different forms of administrative data and with other data sources. The Administrative Data Liaison Service (ADLS) at the University of Oxford<sup>79</sup> distinguishes three options. First, individual level administrative data can be linked to other individual level administrative data. For example, population registers can be linked to education and health registers. This can be done using a unique identifier if available, or through “fuzzy matching methods”, e.g., matching personal details such as names, date of birth or address. Moreover, different cross-sectional cuts of administrative data can also be linked over time to produce a longitudinal dataset. Second, individual level administrative data can be linked to contextual information on, for example, the neighbourhood or an organization such as the school or the university attended. Third, individual level administrative data can be linked to household survey data; this is usually done using a fuzzy matching method. Even if individual administrative data are not available to researchers, it may be possible to link some aggregate indicator published by the corresponding administrative office, i.e. a macro-level indicator, to household level data from household surveys. In this case the same indicator value is attached to all households in the same administrative area. For example, in the 2009 Human Development Report for Mercosur (UNDP, 2009), a multidimensional poverty index for young people was constructed which included one dimension – health and environmental hazard – composed of indicators coming from administrative data at the state level in Brazil and at the provincial level in Argentina.

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<sup>74</sup> Jäntti, Törmälehto and Marlier (2013).

<sup>75</sup> *Ibid.*

<sup>76</sup> *Ibid.*

<sup>77</sup> Information in this paragraph is largely drawn from: <http://bit.ly/1namUwW>.

<sup>78</sup> *Op. cit.*

<sup>79</sup> <http://www.adls.ac.uk/adls-resources/guidance/introduction/>.

Such linking efforts are not free from problems, as experiments with EU-SILC data attest. For example, the quality of linked databases can be affected by inconsistencies between information collected from respondents in the survey and information contained in the administrative databases, in addition to errors that arise in the process of record linkage (Smith, 2011). In addition, public approval to use registers for statistical purposes and respondent consent is needed before carrying out exact record linkage to ensure that respondents are aware of the risks and benefits involved in releasing their administrative records.<sup>80</sup> Because not all respondents agree to this request,<sup>81</sup> non-response increases. Moreover, consent bias may occur if survey data are used for the non-consenting households and register data for the consenting ones.<sup>82</sup> According to Sakshaug and Kreuter (2012), several studies have found important differences between consenting and non-consenting respondents on survey variables.<sup>83</sup> Because statistical use of administrative data involves linking data from different registers moreover, it may invoke the spectre of “Big Brother Syndrome”.<sup>84</sup>

These problems notwithstanding, a Eurostat working paper on the use of registers in the context of EU-SILC recommends combining registers with survey data, instead of relying solely on administrative data. According to the report,

The use of registers should be part of a wider strategy where most probably the way forward will consist in making use of registers not as a substitute for data collected through surveys, but as a complement, often through the combination of multiple data sources and multi-mode data collection.<sup>85</sup>

In summary, while administrative records offer promise in amplifying the data available on different aspects of deprivation and can aspire to full population coverage, at low cost and high frequency, challenges remain. Several hurdles need to be addressed to enable linkages to household surveys, an indispensable step for the in-depth analysis of poverty, particularly the estimation of individual and

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<sup>80</sup> Sakshaug and Kreuter (2012), pp. 113–114.

<sup>81</sup> Gender, age, education and wealth are some variables that are found to be strongly related to the likelihood of consent. For example, see Tate et al. (2006, pp. 294–298). This study finds that a large proportion of mothers who were interviewed gave permission for linkage. However, there were some groups who were less likely to do so, particularly those from minority ethnic groups.

<sup>82</sup> Sakshaug and Kreuter, (2012), pp. 113–122.

<sup>83</sup> Sakshaug and Kreuter, (2012), p. 113.

<sup>84</sup> United Nations ECE (2007).

<sup>85</sup> Jäntti, Törmälehto, and Marlier (2013).

household based multidimensional poverty. Particularly in developing countries, the use of such registries and their linkages to household surveys remains very limited.

## 4.2 Big Data

Because Big Data span so many varied data sources, they have the potential to fill data gaps and in myriad ways. The idea of using such data has been traced to a much cited 2009 paper which found that light emissions picked up by satellites could track GDP growth and proposed that they could supplement national accounting in data-poor countries.<sup>86</sup> Here we consider satellite imagery and call data records, two approaches that would seem to show the most potential for poverty monitoring so far.<sup>87</sup>

### 4.2.1 Sampling

Traditionally, household survey sample sizes depend critically on the availability of reliable and accessible census databases and census cartography, although these are often unreliable and almost always outdated.<sup>88</sup> Sixteen African countries, for example, have not had a census in the past 10 years. Munoz and Langeraar (2013) propose an alternative strategy to deliver a sample of households with well-defined selection probabilities on the basis of GIS techniques, GPS, high resolution satellite imagery and additional information to censuses, in particular the LandScan population database (which itself uses spatial and imagery analysis technologies, as well as census data). They applied this method to derive a sample for a household survey in Myanmar – at a time when the last census was decades out of date.

### 4.2.2 Poverty Measurement

Big Data could provide variables and insights on various dimensions of poverty. These could be spatially linked with other information including household survey data. Variables that are available open-source for exploration include road access, electricity, natural disasters (earthquakes, hurricanes, fires), precipitation, weather, and also many variables relating to sustainable development, from biodiversity and air pollution to flooding. Furthermore, with some analysis, Big Data can be used to estimate income poverty.

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<sup>86</sup> Henderson et al. (2011). This finding has been validated elsewhere, but there is also evidence that this relationship can fade once the penetration of electric lighting approaches saturation (see Smith et al. 2014).

<sup>87</sup> Other data sources used to model deprivation include Twitter content. Quercia (2012) show that, in London, tweet topics in different areas and their sentiment correlated with deprivation.

<sup>88</sup> Munoz and Langeraar (2013).

Given the ubiquity of cell phones and the information about the collective behaviour of users embedded in their ‘call data records’ (CDRs), they are a natural data source to provide granular proxies of poverty at a low cost and in a timely manner.<sup>89</sup> The few existing studies hint at the potential of this approach to classify correctly the socio-economic status of small areas. Of particular interest are methods that can analyse data aggregated to the level of cell towers rather than individual records, thereby reducing privacy concerns, and methods that are easy to interpret, so as to heighten the confidence of data users (Smith-Clarke *et al.* 2014).

For example, Soto *et al.* (2011) use call data records to predict poverty at the level of cell tower areas in a Latin American city with about 500,000 citizens, and compare their findings with official estimates.<sup>90</sup> Using information about the aggregated behavioural, social network and mobility of users, this approach predicted the socio-economic status of 80% of areas correctly. Smith-Clarke *et al.* (2014) report on two experiments they conducted in Côte d’Ivoire using data on total traffic between cell phone towers for over 5 million phone users to construct geographically detailed income poverty maps – but they caution that a lack of up to date and spatially accurate ‘ground truth’ data precluded a more rigorous evaluation of their results. Other types of experiments are underway – for example, Gutierrez *et al.* (2013) derived a proxy wealth indicator for Côte d’Ivoire on the basis of information on phone credit top-ups (they hypothesized that poorer people would be likely to top up their phone credit in smaller amounts and with greater frequency) – but their results have not yet been validated against any established wealth indicator.<sup>91</sup>

Letouzé (2013) argues that if such approaches are shown to have internal validity, then CDRs could be used to examine change in socio-economic levels between official surveys. Moreover, a recent study in Kenya showed that ‘mobility estimates are surprisingly robust to the substantial biases in phone ownership across different geographical and socioeconomic groups’.<sup>92</sup>

If these methodologies, once further refined, reveal promising results, they may provide a means of obtaining rigorous measures of monetary poverty at very granular geographic levels, at low cost and high frequency, without compromising the privacy of individual users. However, some signal limitations will remain. The data are so far focused on monetary poverty, not other dimensions (and can say nothing about causes and interlinkages), and the lack of data at the individual or household level will preclude study of

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<sup>89</sup> <http://www0.cs.ucl.ac.uk/staff/l.capra/publications/chi14-chris.pdf>.

<sup>90</sup> <http://www.vanessafriasmartinez.org/uploads/umap2011.pdf>.

<sup>91</sup> Cited in Smith-Clarke *et al.* (2014). Moreover, they point out that the need for individuals’ financial information raises serious privacy concerns.

<sup>92</sup> Wesolowski, A. (2013) (<http://www.ncbi.nlm.nih.gov/pubmed/23389897>).

intra-household dynamics. Only spatial disaggregation has been demonstrated. Finally, because samples are not representative, further research is needed to determine their composition, whether biases can be corrected for, and the extent to which inferential statistics are appropriate.

## 5. Criteria Underlying a Post-2015 Monitoring Instrument

This paper began by listing ten aspirational technical criteria data collection instruments should fulfil then proceeded to consider how well household surveys – traditional survey programmes, interim surveys and public opinion surveys – perform, as well as administrative data and Big Data. We have also touched on non-technical issues relating to cost, country legitimacy and data protection. We first discuss how the different data sources compare with one another, then consider how a post-2015 monitoring framework could capitalize on the advantages of each, individually and in combination. Table 1 aims to give a sense of the relative strengths of each approach to data collection. Question marks in the table mean either that not enough information is available or that there is too much variability in the criteria across countries to make an assessment.

Table 1: How data collection instruments meet the ten criteria

Criterion	In-depth survey programmes	Interim household surveys	Public opinion surveys	Administrative data	Big Data
Core indicators					
Frequency	*	** _ ***	**_***	***	***
Promptness and availability					
Country coverage	** _ ***		***	**	**
Multi-topic and integrated	***	**	**	*	*
Cross-sectional and inter-temporal comparability	***	***	*_**	?	?
Disaggregation	** _ ***	** _ ***	*	***	***
Population coverage	**	**	**	***	***
Intrahousehold information	**	** _ ***	*	*_***	n/a
Data quality	***	* _ ***	* _ **	?	?

Source: Authors.



**Core indicators.** The ability to produce the core indicators that will underpin a new framework agreement is vital. Traditional survey programmes (in-depth and interim) have a clear advantage, owing to decades of experience in the objective measurement of deprivations. Public opinion surveys, notably Gallup, are beginning to produce some similar estimates – yet a comparison of their income poverty estimates with household survey measures by and large reveals discrepancies, and it is clear that subjective data should not be used to proxy objective deprivations. Administrative systems have the potential to yield very useful data and have been relatively under-used compared to household surveys in measuring the MDGs, but they are incomplete and compromised by numerous data quality issues in many developing countries. Experiments with Big Data have increased markedly in the past five years and shown some ability to measure monetary poverty at a high resolution, but much further study is needed before the approach will be a viable way to produce core indicators, through formal or informal channels.

**Frequency.** It is desirable for data on some poverty indicators to be reported at very regular intervals – to register seasonality and financial and natural shocks. Here in-depth survey programmes are at a disadvantage owing to their cost, though a number of national household survey programs – e.g., Indonesia’s SUSENAS and Colombia’s Encuesta de Calidad de Vida – demonstrate the feasibility of annual data collection. A short, powerful harmonised survey focused on a reduced sample and key indicators could collect data on core indicators of human poverty quickly and efficiently. Public opinion surveys can be fielded with high frequency too – DHS/MICS collects data for a given country on average every 5 years, while the Gallup World Poll does so annually in over 90 countries – however, as noted, estimates from public opinion polls have not yet been sufficiently validated. In principle, administrative sources have the potential to provide very frequent updates on core indicators and Big Data, to provide real time estimates. But again, administrative systems are currently too patchy in many countries, and the use of Big Data needs further validation.

**Promptness and availability.** To be relevant to monitoring and policymaking processes, data need to be made available in a timely fashion and readily accessible. Accompanying information should sketch out, in the case of surveys, the sampling design and make available the metadata and microdata. The latter are needed alongside national and subgroup estimates to permit the computation of standard error and the analysis of distributions. Administrative data, should be made available without compromising anonymity. With Big Data, a different set of issues are in play given the private nature of much of the data that are involved; but data that is used in producing poverty estimates should be available in the public domain and their analysis must be transparent.

**Country coverage.** Survey coverage of the developed world has increased markedly – at present, DHS and MICS together cover 112 of about 140 developing countries – and nearly all countries have had some form of household survey, though timeliness is an issue. Public opinion surveys may have wide country coverage. As noted, Gallup surveys over 90 countries each year. Administrative data could potentially be comprehensive though systems are currently far from complete and consistent across countries. For Big Data, full country coverage could be feasible though ICT penetration will be an issue for some countries.

**Multi-topic and integrated.** Household survey programmes have the clear advantage in being able to field more comprehensive, modular surveys while public opinion surveys can only include a selected number of questions on any given issue – though the use of rotating modules could potentially overcome this limitation somewhat. Approaches using administrative or Big Data would need to merge data from different sources, including household surveys, in order to be truly multi-topic and integrated – but as noted, further experiments in linking are needed.

**Cross-sectional and inter-temporal comparability.** The comparability of household surveys will depend on the relevance, validity and reliability of particular questions in each setting where they are fielded. To be comparable, they will require similar sampling designs, a set of questions that capture core indicators in a standardized way, and a similar mode of administration. Administrative systems should aim at comparability for some key indicators though this may be compromised by different government systems for collecting and recording information. With Big Data, again, much more validation is needed.

**Disaggregation.** All surveys are constrained in the extent to which they can represent relatively smaller groups. The larger sample sizes of in-depth household surveys (e.g., tens of thousands in the case of the DHS) permit greater group- and area-based disaggregation than public opinion surveys, where the sample size is typically 1,000 individuals. Administrative data hold the promise of being disaggregated by age, gender, geographic location and any other markers of identity that are captured, especially where they cover a full population of interest. Experiments with Big Data have so far shown the potential to yield fairly granular spatial estimates of poverty but other types of disaggregation are so far limited.

**Population coverage.** Surveys may be biased by their reliance on traditional households as a unit of analysis – which excludes people who are without a home or who live in an institutional setting. Administrative data may aspire to full population coverage but are often incomplete. Big Data are not representative by design and so the extent to which their results accurately represent populations requires investigation.

**Intrahousehold analysis.** Household surveys benefit from a format that permits the collection of gendered data in a straightforward manner (as well as linking data on men and women at the household level). Some surveys are already collecting data of more than one household member, while public opinion surveys typically select one informant per household. Administrative data are often collected at an individual rather than household level and may not link household members. Experiments with Big Data have yet to shed light on intrahousehold dynamics.

**Data quality.** All surveys are subject to some form of error – either statistical or non-statistical. Statistical or sampling error when the sample coverage differs from the whole population, particularly where sampling frames may be outdated or sizeable shares of the population do not live in traditional households. Non-statistical error can arise from data entry and measurement error; the latter, in turn, may include recall error, reporting error and non-response. Training of enumerators is important – here large survey programmes have an advantage. Standard statistical techniques however can give insights into the reliability, validity and statistical significance of estimates. The data quality issues that affect many administrative systems have been discussed. With Big Data, there is the additional complication that data are not sampled or based full population coverage, raising the question of the extent to which they are representative, whether this can be corrected for statistically, and whether inferential statistics have value. Again further study of various forms of Big Data is needed.

So far, these approaches to measurement have been treated largely separately but their merging holds considerable potential to link data sources at the individual and household levels, and with other contextual data. This is a very fast moving area with a great deal of ongoing experimentation. Still, it will take time to figure out, from the many research initiatives, what is reliable enough for policy and also to clarify the biases associated with different collection methods and their linking.

The need to support national country statistical systems, clarify costs and protect ethical standards are also crucial issues underpinning measurement efforts. We have addressed the issue of system building in the discussion above, pointing to the range of possibilities for survey implementation and the need to ensure the development of national statistical systems. Such development must also include the progressive improvement of administrative systems so that they fulfil their potential to become a source of high-quality data.

To guide data collection efforts, we stress the need for cost estimates of the various proposals under consideration – as very little information is available to inform a rigorous cost-benefit analysis. Our review also suggests the need for an international body to fulfil functions others have described in detail, such as

a) continuous improvement of indicator definitions; b) ongoing support for questionnaire design and harmonisation; c) synthesis of data and indicators for ongoing monitoring; d) preparing time-saving new technologies for survey data collection, entry, analysis, visualization, publication and dissemination; and e) further analysis of the possibilities of linking data from diverse sources.

## 6. Concluding Remarks

Already in 1987, when structural adjustment was affecting basic needs, the authors of UNICEF's *Adjustment with a Human Face* (Cornia *et al.* 1987) cried out for more frequent monitoring data, as well as international coordination in order that such data would engage and inform decision-makers directly:

Statistics are urgently needed for a comprehensive dossier of information on infant mortality rates and nutrition levels. Malnutrition must be monitored as closely as monetary variables. This stock-taking would be co-ordinated by a central technical unit which would establish a line of reporting to bureaucrats and political decision-makers, involving them directly in matters of social responsibility.

The post-2015 SDGs offer a much-awaited opportunity to address this long-recognised need for frequent, timely, and compelling statistics on poverty and deprivation in all their forms, alongside data on pivotal environmental issues. Multiple types and scales of data collection and analysis will be required to accomplish this aim. Information on the multiple dimensions of poverty for the same respondents is required to illuminate the interconnected deprivations poor people experience at the same time (UNDP 2010). This paper has set out a proposal regarding how to advance data collection pertaining to human poverty in all its forms while simultaneously strengthening statistical capacity and national ownership.

In particular, we have argued that traditional in-depth survey programmes accompanied by interim surveys – a fast moving area of development, facilitated by many new technological developments – have the greatest potential for monitoring the core indicators of human poverty and conform to most of the criteria enumerated above. Public opinion surveys are essential in capturing people's perceptions and values, but so far have been less successful in measuring official deprivations. Administrative systems hold great promise, but further strengthening to address completeness and data quality issues is needed before they can be relied upon more fully. And while Big Data offers great potential, it is a very new field with multiple challenges that will need to be investigated and overcome before methods based on such data can become part of the standard poverty measurement tool-kit.

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## Appendices

### Appendix 1: Some Survey-based Core Tier 1 SDG Indicators related to Human Poverty

The table below contains a subset of the proposed Tier 1 core SDG indicators that depend upon household budget or income/expenditure surveys or standard modules in multi-topic household surveys. We do not cover SDGs that primarily arise from labour force or health surveys.

Note that some of these indicators traditionally combine data sources (survey, census, administrative) or are primarily taken from a different data sources but could be triangulated by data from household surveys.

There are a number of ambiguities inherent in such a list. For example, one round of survey data is not sufficient for computing primary school completion rates (although other indicators related to primary school attendance or enrolment could be computed). Also, what are considered to be ‘standard’ modules of multi-topic household surveys vary. For example, questions on sexual violence, anaemia, and HIV/AIDS were not included, but they may be considered standard in some contexts. Finally, some indicators, such as mobile subscriptions, distance to a road, waste collection, and violence could be taken from administrative rather than survey data. The advantage of including such questions in a household survey is that the interlinkages with other dimensions of disadvantage or poverty these households experience can be easily studied.

Indicator number	Potential and Indicative Indicator	Potential lead agency or agencies	Other goals indicator applies to
<b>Goal 1. End poverty in all its forms everywhere</b>			
1	Percentage of population below \$1.25 (PPP) per day (MDG indicator)	World Bank	8
2	Percentage of population living below national poverty line, differentiated by urban and rural (modified MDG indicator)	World Bank, UN-DESA	11
4	Percentage of women and men with secure rights to land, measured by (i) percentage with documented rights to land and (ii) percentage who do not fear arbitrary dispossession of land	FAO, UNDP	2, 5, 10
5	Losses from natural disasters, by climate and non-climate-related events, by urban/rural (in US\$ and lives lost)	UNISDR, FAO, WHO	2, 6, 11, 13
6	[Level of extreme multidimensional poverty] – to be developed	World Bank, UN Statistics Division	2, 3, 4, 8
<b>Goal 2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture</b>			

7	Percentage of population below minimum level of dietary energy consumption (MDG indicator)	FAO, WHO	3
9	Prevalence of stunting in children under [5] years of age	WHO, UNICEF	1, 3
<b>Goal 3. Ensure healthy lives and promote well-being for all at all ages</b>			
17	Maternal mortality ratio (MDG indicator) and rate	WHO, UN Population Division, UNICEF, World Bank	5
18	Neonatal, infant, and under-5 mortality rates (modified MDG indicator)	WHO, UNICEF, UN Population Division	
30	Percent of children receiving full immunization as recommended by WHO	UNICEF, GAVI, WHO	
31	Contraceptive prevalence rate (MDG indicator)	UN Population Division and UNFPA	5
33	Household Dietary Diversity Score	FAO	2
<b>Goal 4. Ensure inclusive and equitable quality education and promote life-long learning opportunities for all</b>			
35	Percentage of children receiving at least one year of a quality pre-primary education program.	UNESCO, UNICEF, World Bank	
36	Early Child Development Index (ECDI)	UNICEF	
41	Tertiary enrollment rates for women and men	UNESCO	5, 8
<b>Goal 5. Achieve gender equality and empower all women and girls</b>			
42	Prevalence of women 15–49 who have experienced physical or sexual violence by an intimate partner in the last 12 months	WHO, UN Statistics Division	3
44	Percentage of women aged 20–24 who were married or in a union before age 18	UNICEF	3
48	Met demand for family planning (modified MDG indicator)	UN Population Division, UNFPA	3
<b>Goal 6. Ensure availability and sustainable management of water and sanitation for all</b>			
50	Percentage of population using basic drinking water, by urban/rural (modified MDG indicator)	WHO/UNICEF Joint Monitoring Programme (JMP)	1, 2, 3, 5, 9, 11
51	Percentage of population using basic sanitation services, by urban/rural (modified MDG indicator)	WHO/UNICEF Joint Monitoring Programme (JMP)	1, 2, 3, 5, 9, 11

<b>Goal 7. Ensure access to affordable, reliable, sustainable, and modern energy for all</b>			
55	Share of the population with access to modern cooking solutions, by urban/rural	Sustainable Energy for All, IEA, WHO	1, 3, 5, 9, 11, 12
56	Share of the population with access to reliable electricity, by urban/rural	Sustainable Energy for All, IEA, World Bank	1, 3, 5, 9, 11, 12
<b>Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</b>			
<b>Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</b>			
64	Access to all-weather road (% access within [x] km distance to road)	World Bank	2, 7, 11
65	Mobile broadband subscriptions per 100 inhabitants, by urban/rural	ITU	2, 5, 11, 17
66	[Index on ICT infrastructure performance] – to be developed	ITU	17
<b>Goal 10. Reduce inequality within and among countries</b>			
70	[Indicator on inequality at top end of income distribution: GNI share of richest 10% or Palma Ratio]	UN Statistics Division, World Bank, OECD	1, 8
71	Percentage of households with incomes below 50% of median income ("relative poverty")	UN Statistics Division, World Bank, OECD	1, 8
<b>Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable</b>			
72	Percentage of urban population living in slums or informal settlements (MDG Indicator)	UN-Habitat and Global City Indicators Facility	1
73	Percentage of urban households with regular solid waste collection [and recycling] – to be developed	UN-Habitat	3, 12
74	Percentage of people within [0.5]km of public transit running at least every [20] minutes	UN-Habitat	9
<b>Goal 12. Ensure sustainable consumption and production patterns</b>			
<b>Goal 13. Take urgent action to combat climate change and its impacts</b>			
<b>Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development</b>			
<b>Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</b>			

<b>Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</b>			
93	Violent injuries and deaths per 100,000 population	UNODC, WHO, UNOCHA	3, 5
98	Percentage of children under age 5 whose birth is registered with a civil authority	UNICEF	3, 5, 10
<b>Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development</b>			
109	Evaluative well-being and positive mood affect	SDSN, OECD	3

## Appendix 2 – Major International Household Survey Programmes: LSMS, DHS and MICS

With Maria Emma Santos

### *Living Standard Measurement Study (LSMS)*

The Living Standards Measurement Study (LSMS) was a research project initiated by the Development Research Group (DECRG) at the World Bank in 1980 with the aim of collecting household data in developing countries – and improving the quality of the data that was already being collected at the time the programme started – on a variety of fundamental dimensions of well-being in order to inform policy. The goal was to “foster increased use of household data as a basis for policy decision making” (Grosh and Glewwe, 1995). The first LSMS surveys were conducted in Cote d’Ivoire in 1985 and in Peru in 1985-86.

Grosh and Glewwe (1995) specify some distinctive features of LSMS surveys. In the first place, LSMS surveys have a multi-topic questionnaire, designed to study multiple aspects of household welfare and behaviour, which we list below. Second, there are multi-level questionnaires: typically a household questionnaire, an individual questionnaire and a community questionnaire, on which we also comment below. Third, there are extensive quality control features when collecting and processing the data in LSMS surveys. Some examples of the LSMS surveys’ quality controls are as follows: several features of the questionnaire help to minimize interviewer error; all potential responses to each question are marked on the questionnaire with a numbered code (thus the interviewer only needs to write the response code); the household questionnaire can be entered into the computer straight from the completed questionnaire (eliminating the additional step of transcribing codes onto data entry sheets); it is possible to make changes (as well as translations) into the questionnaire easily and quickly, either in response to the field test or as a policy change over the years; the fieldwork is highly decentralized and conducted in teams of six people, including the supervisor who must visit about 35% of the sampled households to check on the accuracy

of the interviewer's data; additionally, personal computers are used in the field to carry out data entry and editing at all stages (something that was highly innovative back in 1985); furthermore when all of the data from a single questionnaire have been recorded, consistency checks are run on data from different parts of the questionnaire.<sup>93</sup> Fourth, LSMS have nationally representative but relatively small samples, between 2000 and 5000 households. Thus, accurate estimates can be obtained for the country level and for large subareas (urban/rural, or some agroclimatic zones) but not for political jurisdictions (states or provinces) (Grosh and Glewwe, 2000, p. 8). Fifth, although originally it was intended that LSMS surveys would be conducted annually, experience over time led doing a survey every three to five years, understanding that this would provide enough information to elaborate analyses of household behaviour, and how it changed over time (Grosh and Glewwe, 1995, p.21).

LSMS surveys have been implemented in 38 countries at different points in time, most typically in a cross-sectional fashion, although there are countries that implemented a rotating panel.<sup>94</sup> As expected, there has been variation in terms of the modules each survey has included. Grosh and Glewwe (2000) suggest nine core modules, and another nine modules are presented as additional topics. The nine core modules are the household roster, consumption, education, health, employment, anthropometry, transfers and non-labor income, housing and a community and price data module. The nine additional topics are environmental issues, fertility, migration, income, household enterprises, agriculture, savings, credit and time use. Grosh and Glewwe (2000, p. 12) indicate that traditionally the list of included modules has been the core nine modules (including income from various sources: transfers, wage employment agriculture, household enterprises and miscellaneous sources) plus fertility, migration, agriculture, household enterprises, savings, and credit.

For each suggested module, there are two or three proposed versions: short, standard and extended version, or standard and extended version, depending on the level of interest on the particular topic. For example, there are three versions of the education module. The short one collects information on current and past school attendance, current and past enrolment in school, last grade completed, the highest diploma achieved, whether the school in which the person is currently enrolled is public or private, amount

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<sup>93</sup> See Grosh and Glewwe (1995) for further details on the various forms of quality checks.

<sup>94</sup> The countries are Albania, Armenia, Azerbaijan, Bosnia & Herzegovonia, Brazil, Bulgaria, China, Cote d'Ivoire, Ecuador, Ethiopia, Ghana, Guatemala, Guyana, India-Uttar Pradesh and Bihar, Iraq, Jamaica, Kazakhstan, FR of Yugoslavia-Kosovo, Kyrgyz Republic, Malawi Morocco, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Peru, Romania, Russia, Serbia, South Africa, Tajikistan, Tanzania-Kagera, Tanzania-National, Timor Leste, Uganda and Vietnam. For details see <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTLSMS/0,contentMDK:21485765~menuPK:4196952~pagePK:64168445~piPK:64168309~theSitePK:3358997~isCURL:Y,00.html>.

spent on education (tuition, parent association fees, uniform and other clothes, meals, educational material, meals, transportation, other expenses), and grade repetition. The standard module also includes questions on pre-school level, on the type of institution (private, public, religious, some other) attended at the different levels (and not just the one in which the individual is currently enrolled), a sentence to be read by the respondent and a simple written calculation to be solved, major fields of study in post-secondary education, number of days the school was opened in the previous seven days and number of days the respondent attended school in the previous seven days, whether the person lived at home while going to school (for those who finished), whether there is someone who is not a household member and helps with education expenditure, whether the person has a scholarship, distance to school, time to reach school and means of transportation. There are also questions on apprenticeship and training. In the extended version there are questions about having textbooks, the source they come from (school, bought by parents, some other), the number of hours of homework per day and whether the student participates in a feeding programme at school. Other suggestions for an expanded education module are to administer a cognitive test.<sup>95</sup> Any of these alternative questionnaires is administered to household members of 3 or more years of age. There are also school questionnaires that can complement this information.

Another interesting example is the health module, for which there are also three alternative questionnaires. The short one collects information on self-reported health, which asks for example, number of days of primary daily activities missed due to poor health, health status as compared to the previous year, episodes of diarrhoea and treatment received and utilization and cost of health facilities (the questionnaire discriminates between outpatient visits to public hospitals, public health clinics, private hospital or clinic, doctor, nurse, paramedic, or traditional health practitioner, and hospitalization – number of days, treatment received, etc.). The questionnaire also includes questions regarding access to and source of health insurance. The standard questionnaire asks further questions about self-reported health such as the ability to dress by oneself, stand up from a chair or from the floor, go to the bathroom, sweep the house floor, walk five kilometres, or carry a heavy load, among other specific activities. It also has several questions regarding smoking, alcohol consumption, and regular physical activity such as a sport. Additionally, it includes questions on child immunization, knowledge of diseases that can be transmitted through sexual intercourse, and knowledge of nearby health care providers. The expanded version has an extended module that includes questions on experiencing insomnia, fatigue, hyper-sensitivity, body pain,

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<sup>95</sup> For example, math and reading tests were administered in the LSMS surveys conducted in Ghana (1987/88), Morocco (1990/91) and Jamaica (1988). However, the test, age group tested, and location of test administration all differed substantially (Grosh and Glewwe, 1995, p. 30).

feeling sad and anxiety or fear, a much more detailed questionnaire on utilization and expenditures at health care providers; it also comprises questions where the enumerator needs to do a direct observation of the ability of the person to perform daily activities (rather than self-reporting) and cognitive functioning questions (which test memory, numeracy and ability to follow instructions).

Notably, anthropometric data – height and weight measures for all household members – is recommended as a core-separate module by LSMS (see Grosh and Glewwe, 2000). However, it must be noted that, while in 95% of the cases in which an LSMS survey has been conducted, some version of the health module has been implemented, only 41% of the surveys have implemented the anthropometric module and also only 40% implemented the fertility module.<sup>96</sup> This implies that, in most cases, the health variables collected are mostly related to access to health facilities rather than indicators of functionings.

As already mentioned, information is collected through three levels of questionnaires: the household questionnaire (which collects the information on consumption, housing and agricultural production), the individual questionnaire (employment, education and health) and the community and price questionnaire, which gathers information on local conditions common to all households living in the same community (characteristics of schools and health facilities, sources of fuel and water, availability of electricity, means of communication and agricultural conditions and practices) and it collects information on the prevailing prices of commonly purchased items in local shops and markets.

It is worth making a note regarding the community questionnaire, which offers very valuable information that complements the information obtained from the individual and household questionnaires. Frankenberg (2000, p. 322) notes that there are essentially three ways to assemble community data: (1) using existing (“secondary”) data from administrative archives, something that we have discussed in section 4, (2) conducting community informant interviews, and (3) visiting facilities, service points or markets. Using data from administrative archives is a good option if a community questionnaire is not viable. However it has some important disadvantages such that the definition of the administrative area used in the administrative data may not correspond to the definition of the “community” used in the

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<sup>96</sup> By 2013 a total of 98 LSMS surveys had been conducted (many refer to the same country in different years). Paradoxically, the frequency of LSMS surveys which gathered anthropometric data is higher among the early surveys. For example, this information was gathered for all household members in the first LSMS surveys conducted in Cote d'Ivoire (1985), Ghana (1987/88), Mauritania (1988), Tanzania (1991), and Viet Nam (1992/93); for children only in Jamaica (1988) and Nicaragua (1993); for children and mothers in Pakistan (1991); and for children and both parents in Morocco (1990/91). Out of the 40 surveys that collected anthropometric information, 27 of them were conducted prior to the year 2000.



survey (most commonly, administrative data will come from a more aggregated level); another disadvantage is that, most likely, administrative data can offer much more limited and less specific data as compared to what can be collected with a community questionnaire.<sup>97</sup> Community questionnaires rely on the second and third sources of data mentioned above. Selected “informants” vary with the objective of the survey but can include community members, market traders, and staff at relevant facilities and institutions, such as nurses and teachers, as well as village chiefs (Frankenberg, 2000, p. 315). Most commonly, the community questionnaire is administered in a group interview (to the different informants gathered together) rather than in single-informants interviews.<sup>98</sup> The third source involves conducting, within the community questionnaire, a “facility questionnaire” – that is, visiting markets and sales outlets to gather information on prices as well as schools, health facilities, banks, other sources of credit, and employers. Surveys that collect this type of information offer a much richer view of the availability and quality of the services in the community and of the prices they face. In some LSMS surveys, the collection of data from facilities is organized in such a way that it can be linked to the data collected at the household level.<sup>99</sup> Such matching possibility can be of tremendous value for multidimensional poverty analysis.<sup>100</sup>

There is also a recent companion program to LSMS called the Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA). The national statistics offices of seven Sub-Saharan Africa countries (Ethiopia, Malawi, Mali, Niger, Nigeria, Tanzania, and Uganda) collaborate on this project in order to implement systems of multi-topic, nationally representative panel household surveys with a strong focus on agriculture. The project aims at improving the understanding of the links between agriculture, socioeconomic status, and non-farm income activities.<sup>101</sup>

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<sup>97</sup> The definition of the “community” (on which to administer this questionnaire) is usually tied to the sampling frame: “community” refers to the cluster (a geographical unit, usually census enumeration districts) where the household is located (Frankenberg, 2000).

<sup>98</sup> It is also recommended that more than one group interview is administered to allow for an heterogeneity in responses (Frankenberg, 2000).

<sup>99</sup> Note however that LSMS surveys vary substantially in terms of the price, community, and facility questionnaires that accompanied the household questionnaire (Grosh and Glewwe, 1995, p. 30).

<sup>100</sup> More broadly, the availability of community data may facilitate the study of what is called in Sen’s capability approach, *opportunity freedom*, which refers to the actual opportunities people have, given their personal and social circumstances (Sen, 1992) (which needs to be complemented with the aspect of process freedom, that involves the actual *use* of such choice.)

<sup>101</sup> For further details, see

In sum, the LSMS surveys offer a wide range of possibilities for multidimensional poverty measurement and analysis, and it offers the possibility of considering the monetary dimension, as either the income or consumption modules are always included. Yet, because implementation has varied across countries and over time, the researcher is advised to first check the included modules and type of questionnaires implemented in the country of interest to verify the data fits the research purpose.

### *The Demographic and Health Surveys (DHS)*

The MEASURE DHS (Demographic and Health Survey) project started in 1984, funded mainly by the US Agency for International Development (USAID). The DHS surveys were modelled after the World Fertility Survey (WFS) and the Contraceptive Prevalence Surveys (CPS), which revolutionized demographic analysis during the 1970s and 1980s with detailed surveys on women's fertility and contraceptive use in over 60 countries (Mather, 2007; Vaessen *et al.* 2005). However, the DHS are nationally representative household surveys that provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition.

The survey covers the following topics: anaemia, child health (vaccinations, illnesses, newborn care), domestic violence, education, environmental health (namely, water, sanitation and cooking fuel), family planning (knowledge and use of contraceptives), fertility and fertility preferences, HIV/AIDS prevalence as well as knowledge, attitudes and behaviour, household and respondent characteristics (electricity, housing quality, possessions, education and school attendance, age, sex, employment), infant and child mortality, malaria (ownership of mosquito nets, prevalence and treatment of fever), maternal health and maternal mortality, nutrition (child feeding practices, vitamin supplementation, anthropometry of children under 5 years of age and women in reproductive age, anemia, salt iodization), tobacco use, unmet need for family planning, wealth and women's empowerment. Sometimes other more specific health modules are included.

Data on the mentioned dimensions are collected through three questionnaires: the household questionnaire; the women's questionnaire, implemented to all women in household reproductive age (15–45 years old); and the male's questionnaire, implemented to all men in household between 15–59 (or sometimes 15–54) years of age. The household questionnaire collects information on characteristics of the household's dwelling, household members' demographic characteristics and education and data related to

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<http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTLSMS/EXTSURAGRI/0,,contentMDK:22800726~pagePK:64168445~piPK:64168309~theSitePK:7420261,00.html>, accessed 11/09/13.

the height and weight for women between 15–49 years old and children 0–5 years old in the household. The household questionnaire is used to identify members (men and women) of the household who are eligible for an individual interview. In some countries only women are interviewed. Individual questionnaires include information on fertility, family planning and maternal and child health.

There are two main types of DHS surveys: the standard one, which is typically conducted every five years with large sample sizes (between 5,000 and 30,000 households) and the interim one, done in-between two standard surveys, which collects information on a reduced set of indicators and has a smaller sample size. MEASURE DHS also conducts other type of surveys, which are much more focused on a particular topic, such as the AIDS Indicator Survey, the Malaria Indicator Surveys, or the Service Provision Assessment Survey. There are also surveys that use a much more reduced questionnaire, such as the Key Indicators Survey. DHS surveys are typically cross-section, but in some cases, such as Morocco 1995, used a panel structure. By 2013, some form of DHS survey had been implemented in 90 countries.<sup>102</sup>

As mentioned above, DHS surveys offer information on a wide range of topics and are nationally representative; thus they constitute a good source of data for multidimensional poverty estimation. In fact, DHS surveys are one of the primary data sets used to compute the Multidimensional Poverty Index (MPI) (Alkire and Santos, 2010, 2014; PNUD, 2010). However, it must be noted that DHS surveys do not collect income or consumption information and therefore this dimension cannot be considered in estimations with these data. They do however collect information on durable goods and assets such as ownership of phone, TV, or refrigerator, among others, and ownership of land, livestock, and poultry.

### *The Multiple Indicators Cluster Surveys (MICS)*

UNICEF's MICS program started in 1995, with the aim of measuring progress towards an internationally agreed set of mid-decade goals in the World Summit for Children. The first round of MICS were conducted around 1995 in more than 60 countries. Then a second round was conducted around 2000 in about 65 countries, a third round was conducted in 2005–06 in over 50 countries, a fourth round was conducted in 2009–2011 and a fifth round is taking place between 2012–2014. Since the program begun, a total of 189 countries have participated in one or more survey rounds. MICS have become an instrument for monitoring other international goals aside from the original ones, such as the MDGs, the World Fit for Children, the UNGASS targets on HIV/AIDS and the Abuja targets for malaria.<sup>103</sup> The covered topics

<sup>102</sup> See [www.measuredhs.com/What-We-Do/Survey-Types/DHS.cfm](http://www.measuredhs.com/What-We-Do/Survey-Types/DHS.cfm) for further information on DHS.

<sup>103</sup> See [www.unicef.org/statistics/index\\_24302](http://www.unicef.org/statistics/index_24302) and [www.childinfo.org](http://www.childinfo.org) for further information on MICS.

include health, education, child protection and HIV/AIDS. The survey design follows closely that of DHS so as to harmonize survey questions and modules. This facilitates cross-country comparisons of estimates obtained using DHS data with those obtained using MICS data. In fact, MICS constitute the other main data source used to compute the MPI.

MICS surveys are organized in four questionnaires: a household questionnaire, women's questionnaire, men's questionnaire and children questionnaire. The household questionnaire collects information on the demographic characteristics of each member, their education, water and sanitation dwelling characteristics (such as material of the house, energy used for cooking, etc), insecticide treated nets, indoor residual spraying of the household, child labor, child discipline, hand washing and salt iodization. Both the women and the men's questionnaire collect information on access to mass media and information and communication technology, child mortality, attitudes towards domestic violence, marriage/union, sexual behaviour, HIV/AIDS, tobacco and alcohol use and life satisfaction. The women's questionnaire also collects information on maternal and newborn health, contraception, female genital mutilation and maternal mortality, whereas the men's questionnaire also collects information on circumcision. However, note that anthropometric data is not collected for household members older than 5 years of age. Finally, the child questionnaire is administered to all mothers or caretakers who care for a child that lives with them and is under the age of 5 years; a separate questionnaire is used for each child. The questionnaire collects information on early childhood development, breastfeeding practices, care of illness, malaria, immunization and anthropometry. However, note that MICS questionnaires have evolved over the five phases and have been implemented to different extents according to the country's capacity. Thus, not all the mentioned topics may be found in earlier phases or in all countries. MICS are implemented by government organizations with the support and assistance of UNICEF and other partners.